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Data Paper

Seed plant diversity of different forest types in Liangshui National Natural Reserve

Hongfeng Wang‡, Xueyun Dong§

‡ School of Forestry, Northeast Forestry University, Harbin, China
§ School of Food Engineering Harbin University, Harbin, China

Corresponding author: Hongfeng Wang (wanghongfeng90@163.com)

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Abstract

Background

Thirty years ago, there was a monograph of vegetation and plant diversity in the region prepared by the Department of Forestry at the Northeast Forestry University (unpublished), but the variety of plants in the region has changed significantly over the past 30 years. In future years, the authors hope to publish a new monograph and this research is to prepare for this work. This study aimed at reporting the characteristics of plant diversity in five different forest types in Liangshui National Natural Reserve, China, each with three 25 × 25 m tree quadrats, twelve 5 × 5 m wide shrub quadrats and twelve 1 × 1 m wide herbaceous quadrats. Censuses of each forest type were conducted in 2016.

New information

The five main forest types presented differences in structure, diversity and species richness.

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Keywords

China, diversity, quadrat, Liangshui Natural Reserve, conservation, species inventory

Introduction

The Korean pine forest of Liangshui National Natural Reserve is the most important primitive broad-leaved Korean pine forest in China and it is also one of the modern Korean pine distribution centres (Liu 2015, Zhang et al. 2000). The primitive broad-leaved Korean pine forest area is less than 40000 hm^2 in China (Liu et al. 2014), while there are 4100 hm^2 in Liangshui National Natural Reserve, accounting for 11% of the country (Liu et al. 2014). Liangshui National Natural Reserve is rich in biodiversity, preserves several species of the Tertiary plant communities and has an irreplaceable role in maintaining global diversity (Chen et al. 2012, Liu et al. 1993, Ma et al. 2007, Wang 1981, Rong et al. 2009). Korean pine forest has existed on earth for at least 30 million years, but the existing broad-leaved Korean pine forests of the Reserve formed about 3000 years ago. The Korean pine forest in this area is young, the age of the oldest individual is no more than 500 years, with a 1.5 m breast diameter. The tree height here is 15-40 m and seeds produced per plant are about 30 kg (Liu 2015). Although the Liangshui National Nature Reserve is very important, research for the different forests is not comprehensive and the data of plant diversity are still insufficient. In this research, the plant diversity of five different forest types in this area were studied, which provided the basic data for the study of biodiversity in this area.

Project description

Title: Construction of Plant checklist Database in Heilongjiang Province

Personnel: Wang Hongfeng

Study area description: Liangshui National Natural Reserve is located in the southeastern of the Xiaoxing'anling Mountains in Heilongjiang Province, China (47°7'39"-47°14'22" N, 128°48'30"-128°55'50" E). It is made up of hills, the terrain is high in south and low in north. The average elevation is about 400 m, the highest elevation is 707.3 m, the lowest is 280 m, mountain slope is generally 10-15 degrees (The Compilation Group Physical Geography of China 1986). This area belongs to the temperate continental monsoon climate. The extreme minimum temperature is -43.9 °C and the extreme maximum temperature is 38.7 °C. The annual average temperature is about -0.3 °C, positive temperature accumulated is 2200-2600°C. The average annual precipitation is 676 mm, June-August precipitation accounted for more than 60% of annual precipitation. The relative humidity in Liangshui is about 78%. The average annual evaporation is 805 mm, the total sunshine hours are 1848h, frost-free period is 100-120 days, the annual snow period is 130-150 days, frozen soil depth is about 2 m (Liu et al. 2014, Su et al. 2006). The forest types in this region mainly include five types of forest, namely *Ulmus davidiana* var.

japonica—Pinus koraiensis forest (UPF), *Betula costata—Pinus koraiensis* forest (BPF), *Quercus mongolica—Pinus koraiensis* forest (QPF), *Fraxinus mandshurica—Pinus koraiensis* forest (FPF), *Tilia-—Pinus koraiensis* forest (TPF).

Funding: Fundamental Research Funds for the Central Universities (2572015CA14); Construction of the plant checklist database in Heilongjiang province.

Sampling methods

Study extent: The dataset was collected between August 2016 and August 2017.

Sampling description: A square plot approach was chosen to sample forest diversity. A total of five major forest types were selected, namely *Ulmus davidiana* var. *japonica—Pinus koraiensis* forest, *Betula costata—Pinus koraiensis* forest, *Quercus mongolica—Pinus koraiensis* forest, *Fraxinus mandshurica—Pinus koraiensis* forest, *Tilia—Pinus koraiensis* forest. Each forest type was set with 3 tree quadrats, 12 shrub quadrats with sampling from all the four corners and 12 herbaceous quadrats. The size of the tree quadrate was 625 m^2 (25 × 25 m) which had four shrub plots (5 × 5 m) distributed on the four corners. Shrub plots 25 m^2 which also had four herbaceous plots (1 × 1 m) distributed on the four corners. The plant species name were identified according to *The researches of liangshui natural* (Ma 1993), *Arbor flora of Heilongjiang Province* (Zhou 1986), *Flora plantarum herbacearum chinae boreali–orientalis* (Liou 1959), *Silva of Heilongjiang* (Zhou 1985), *Flora of China* (Wu et al. 2013), *Key of Plants of Northeastern China* (Fu 1995), *Flora Republicae Popularis Sinicae* (Editorial Committee of Flora of China of Chinese Academy Sciense 2004) and a plant checklist was obtained by survey. The number and height of each species were recorded for all plots, the crown of the trees was recorded, the coverage and total coverage of shrubs and herbs were also recorded.

Quality control: The present dataset was updated to match the APGIV classification of angiosperm families (The Angiosperm Phylogeny Group 2016) and all species names were checked for validity (spelling and authorship) against online databases (http://tnrs.iplantcollaborative.org/index.html, http://ipni.org, http://plants.jstor.org, http://www.ville-ge.ch/musinfo/bd/cjb/africa/recherche.php).

Step description: The dataset presented here was collected over a period of one year.

Geographic coverage

Description: Data was collected in five different forest types (*Ulmus davidiana* var. *japonica—Pinus koraiensis* forest, *Betula costata—Pinus koraiensis* forest, *Quercus mongolica—Pinus koraiensis* forest, *Fraxinus mandshurica—Pinus koraiensis* forest, *Tilia—Pinus koraiensis* forest) across the reserve as illustrated inTable 1 Table 2, Table 3, Table 4, Table 5, Table 6, Table 7, Table 8, Table 9, Table 10, Table 11 and Table 12 .

Table 1.

Basic description of five forest types in Liangshui National Natural Reserve, where: UPF = *Ulmus davidiana* var. *japonica—Pinus koraiensis* forest; BPF = *Betula costata—Pinus koraiensis* forest; QPF = *Quercus mongolica—Pinus koraiensis* forest; FPF = *Fraxinus mandshurica—Pinus koraiensis* forest; TPF = *Tilia—Pinus koraiensis* forest.

Forest types	Habitat	Coverage of shrub layer	Coverage of herb layer	Soil
UPF	River bank or valley	40-50%	About 60%	Gravel soil, thick and humid, about 50-60 cm
BPF	Medium or gentle slope	50-60%	40-50%	Dark brown soil, fertility, about 25-30 cm
QPF	Sunny and steep slope	About 30%	30-40%	Gravel soil, barren and dry, 25-30 cm
FPF	River bank or valley	40-50%	About 60%	Gravel soil, thick and humid, about 50-60 cm
TPF	Medium or gentle slope	50-60%	40-50%	Dark brown soil, fertility, about 25-30 cm

Table 2.

Geographical coordinates of quadrats of five forest types in Liangshui National Natural Reserve.

Forest type	Plot number	North latitude	East longitude
UPF	04-T	47°11′33.52"N	128°52′55.85"E
	11-T	47°11′2.41"N	128°53′59.93"E
	13-T	47°10′57.16"N	128°53′44.97"E
BPF	01-T	47°11′5.39"N	128°53′15.30″E
	12-T	47°11′0.43"N	128°53′45.52"E
	03-T	47°11′43.98"N	128°52′59.89"E
QPF	02-T	47°11′57.73"N	128°53′29.72"E
	14-T	47°8′32.22"N	128°54′3.04"E
	15-T	47°8′41.58"N	128°53′50.70"E
FPF	06-T	47°11′43.84"N	128°53′16.33"E
	07-T	47°10′56.62"N	128°53′32.46"E
	08-T	47°10′44.92"N	128°53′36.05"E
TPF	05-T	47°11′44.71"N	128°53′20.16"E

	09-T	47°10′48.91"N	128°53′39.81"E
	10-T	47°11′0.32"N	128°53′47.68"E

Table 3.

The number of species in each family in Liangshui National Natural Reserve.

Family	**Species richness**
Rosaceae	11
Betulaceae	6
Umbelliferae	6
Pinaceae	5
Sapindaceae	5
Adoxaceae	3
Compositae	3
Cyperaceae	3
Fabaceae	3
Araliaceae	2
Asparagaceae	2
Dryopteridaceae	2
Gramineae	2
Oleaceae	2
Ranunculaceae	2
Rhamnaceae	2
Ruscaceae	2
Saxifragaceae	2
Tiliaceae	2
Ulmaceae	2
Urticaceae	2

Actinidiaceae	1
Amaranthaceae	1
Athyriaceae	1
Berberidaceae	1
Campanulaceae	1
Cannabaceae	1
Caprifoliaceae	1
Caryophyllaceae	1
Celastraceae	1
Cruciferae	1
Equisetaceae	1
Hydrangeaceae	1
Labiatae	1
Liliaceae	1
Malvaceae	1
Melanthiaceae	1
Oxalidaceae	1
Papaveraceae	1
Phrymaceae	1
Polemoniaceae	1
Primulaceae	1
Pteridaceae	1
Rubiaceae	1
Rutaceae	1
Salicaceae	1
Scrophulariaceae	1
Violaceae	1

Table 4.

The number of individuals in each family of tree in Liangshui National Natural Reserve.

Family	**Number of individuals**
Pinaceae	535
Sapindaceae	462
Betulaceae	226
Tiliaceae	119
Ulmaceae	96
Fabaceae	43
Oleaceae	22
Salicaceae	20
Rosaceae	10
Rhamnaceae	6
Rutaceae	1

Table 5.

The number of individuals in each family of shrub in Liangshui National Natural Reserve.

Family	**Number of individuals**
Araliaceae	177
Betulaceae	136
Adoxaceae	124
Caprifoliaceae	107
Rosaceae	77
Oleaceae	30
Berberidaceae	10
Sapindaceae	9
Hydrangeaceae	4

Celastraceae	3
Rhamnaceae	2
Actinidiaceae	1

Table 6.

The number of individuals in each family of herb in Liangshui National Natural Reserve.

Family	**Number of individuals**
Oxalidaceae	445
Umbelliferae	332
Cyperaceae	305
Saxifragaceae	237
Rosaceae	231
Papaveraceae	194
Athyriaceae	171
Ruscaceae	114
Urticaceae	113
Adoxaceae	101
Gramineae	98
Compositae	55
Ranunculaceae	54
Amaranthaceae	53
Pteridaceae	40
Dryopteridaceae	38
Rubiaceae	37
Melanthiaceae	35
Violaceae	32
Labiatae	29

Asparagaceae	16
Fabaceae	10
Campanulaceae	7
Caryophyllaceae	7
Cruciferae	7
Liliaceae	6
Malvaceae	5
Cannabaceae	4
Polemoniaceae	3
Primulaceae	3
Equisetaceae	2
Phrymaceae	2
Scrophulariaceae	1

Table 7.

The number of individuals in each species of tree in Liangshui National Natural Reserve. (Species names are checked by TPL)

Species	**Number of individuals**
Acer pictum subsp. *mono* Thunb.	270
Picea koraiensis Nakai	234
Pinus koraiensis Siebold & Zucc.	189
Betula lenta L.	162
Acer ukurunduense (Trautv. & C.A.Mey.) E.Murray	116
Tilia amurensis Rupr.	103
Ulmus davidiana var. *japonica* (Rehder) Nakai	80
Acer tegmentosum Maxim.	76
Picea jezoensis var. *microsperma* (Siebold & Zucc.) Carrière	72
Betula platyphylla Sukaczev	51

Quercus mongolica Fisch. ex Ledeb.	39
Pinus sylvestris var. *mongolica* Litv.	34
Fraxinus mandshurica Rupr.	22
Populus davidiana (Dode) C.K.Schneid.	20
Tilia mandshurica Rupr. & Maxim.	16
Ulmus laciniata (Trautv.) Mayr	16
Betula dahurica Pall.	9
Larix gmelinii (Rupr.) Kuzen.	6
Rhamnus davurica Pall.	6
Amygdalus davidiana (Carr.) Franch.	6
Maackia amurensis Rupr. et Maxim.	4
Alnus hirsuta (Spach) Rupr.	3
Padus avium L.	2
Sorbus dacica Borbás	2
Alnus cremastogyne Burkill	1
Phellodendron amurense Rupr.	1

Table 8.

The number of individuals in each species of shrub in Liangshui National Natural Reserve.

Species	**Number of individuals**
Eleutherococcus senticosus (Rupr. & Maxim.) Maxim.	165
Corylus mandshurica (Maxim.) C.K.Schneid.	136
Sambucus williamsii Hance	124
Lonicera japonica Thunb.	107
Sorbaria sorbifolia (L.) A.Braun	51
Syringa reticulata subsp. *amurensis* (Rupr.) P.S.Green & M.C.Chang	30
Cerasus verecunda Koehne	21

Aralia elata var. *glabrescens* (Miq.) Seem.	12
Berberis ferdinandi-coburgii C.K.Schneid.	10
Acer tataricum subsp. *ginnala* (Maxim.) Wesm.	6
Acer pictum subsp. *mono* Thunb.	4
Deutzia glabrata Kom.	4
Spiraea thunbergii Siebold ex Blume	4
Euonymus alatus (Thunb.) Siebold	3
Rhamnus davurica Pall.	2
Rosa davurica Pall.	1

Table 9.

The number of individuals in each species of herb in Liangshui National Natural Reserve.

Species	**Number of individuals**
Oxalis griffithii Edgew. & Hook. f.	445
Carex leiorhyncha C.A.Mey.	279
Ostericum sieboldii (Miq.) Nakai	278
Chrysosplenium lectuscochleae Kitag.	236
Filipendula palmata (Pall.) Maxim.	213
Hylomecon japonica (Thunb.) Prantl & Kündig	194
Athyrium brevifrons Nakai ex Kitag.	171
Maianthemum bifolium (L.) F.W.Schmidt	109
Urtica angustifolia Fisch. ex Hornem.	104
Agrostis clavata Trin.	97
Adoxa moschatellina L.	73
Chenopodium album L.	53
Enemion raddeanum Regel	52
Sanicula rubriflora F. Schmidt ex Maxim.	44

Adiantum pedatum L.	40
Saussurea alatipes Hemsl.	38
Galium spurium L.	37
Paris verticillata M.Bieb.	35
Viola chaerophylloides (Regel) W. Becker	32
Meehania urticifolia (Miq.) Makino	29
Sambucus javanica Blume	28
Polystichum tripteron (Kunze) C. Presl	27
Carex breviculmis R.Br.	23
Parasenecio hastatus (Linn.) H. Koyama	16
Geum aleppicum Jacq.	12
Dryopteris crassirhizoma Nakai	11
Lathyrus davidii Hance	10
Polygonatum odoratum (Mill.) Druce	10
Urtica laetevirens Maxim.	9
Adenophora tetraphylla (Thunb.) A.DC.	7
Cardamine leucantha (Tausch) O.E.Schulz	7
Stellaria radians L.	7
Asparagus oligoclonos Maxim.	6
Lilium distichum Nakai ex Kamib.	6
Abutilon theophrasti Medik.	5
Agrimonia pilosa Ledeb.	5
Convallaria majalis L.	5
Humulus scandens (Lour.) Merr.	4
Carex siderosticta Hance	3
Heracleum hemsleyanum Diels	3

Ostericum grosseserratum Maxim.	3
Polemonium caeruleum L.	3
Trientalis europaea (L.) U.Manns & Anderb.	3
Aconitum volubile Pall. ex Koelle	2
Carum buriaticum Turcz.	2
Equisetum hyemale L.	2
Peucedanum praeruptorum Dunn	2
Phryma leptostachya subsp. *asiatica* (Koidz.) Honda	2
Artemisia stolonifera Maxim.	1
Chrysosplenium sinicum Maxim.	1
Fragaria orientalis Losinsk.	1
Miscanthus sacchariflorus (Maxim.) Hack.	1
Pseudolysimachion spurium L.	1

Table 10.

The characteristics of tree community of five forest types in Liangshui National Natural Reserve, where: UPF = *Ulmus davidiana* var. *japonica—Pinus koraiensis* forest; BPF = *Betula costata—Pinus koraiensis* forest; QPF = *Quercus mongolica—Pinus koraiensis* forest; FPF = *Fraxinus mandshurica—Pinus koraiensis* forest; TPF = *Tilia—Pinus koraiensis* forest; DBH = diameter at breast height; N = number.

Families/Species	**UPF**		**BPF**		**QPF**		**FPF**		**TPF**	
	N	DBH (cm)	N	DBH (cm)	N	DBH (cm)	N	DBH (cm)	N	DBH (cm)
Betulaceae										
Alnus cremastogyne Burkill	-	-	-	-	-	-	1	10.5	-	-
Alnus hirsuta (Spach) Rupr.	-	-	-	-	-	-	3	16.87	-	-
Betula dahurica Pall.	-	-	-	-	9	22.55	-	-	-	-
Betula lenta Ehrh.	-	-	112	18.56	28	22.96	4	13.8	18	10.14
Betula platyphylla Sukaczev	-	-	44	19.69	2	28	3	18.33	2	19.75

Fabaceae										
Maackia amurensis Rupr. et Maxim.	-	-	-	-	4	14.6	-	-	-	-
Quercus mongolica Fisch. ex Ledeb.	-	-	-	-	39	17.86	-	-	-	-
Oleaceae										
Fraxinus mandshurica Rupr.	1	33	-	-	1	2.8	5	16.44	15	29.23
Pinaceae										
Larix gmelinii (Rupr.) Kuzen.	-	-	6	11.87	-	-	-	-	-	-
Picea jezoensis var. *microsperma* (Siebold & Zucc.) Carrière	3	25.17	38	11.36	18	7.07	8	15.99	5	37.3
Picea koraiensis Nakai	32	14.46	112	9.86	55	7.47	17	15.76	18	8.58
Pinus koraiensis Siebold & Zucc.	21	51.45	64	23.19	60	12.79	13	49.59	31	46.92
Pinus sylvestris var. *mongolica* Litv.	-	-	12	5.75	22	1.77	-	-	-	-
Rhamnaceae										
Rhamnus davurica Pall.	-	-	6	5.2	-	-	-	-	-	-
Rosaceae										
Amygdalus davidiana (Carr.) Franch.	-	-	4	4	-	-	-	-	2	21
Padus avium L.	-	-	-	-	1	8	1	4.5	-	-
Sorbus dacica Borbás	-	-	-	-	-	-	-	-	2	5.5
Rutaceae										
Phellodendron amurense Rupr.	-	-	-	-	1	20	-	-	-	-
Salicaceae										
Populus davidiana (Dode) C.K.Schneid.	2	7.1	-	-	18	16.5	-	-	-	-
Sapindaceae										
Acer pictum subsp. *mono* Thunb.	29	7	47	5.75	60	8.16	57	6.03	77	5.42
Acer tegmentosum Maxim.	24	3.88	3	4.67	2	4.4	12	5.6	35	6.55
Acer ukurunduense (Trautv. & C.A.Mey.) E.Murray	19	6.27	18	4.74	53	12.39	17	3.09	9	3.53
Tiliaceae										

Tilia amurensis Rupr.	10	17.85	17	11.86	21	12.18	7	17.06	48	16.59
Tilia mandshurica Rupr. & Maxim.	-	-	-	-	2	14.5	1	3	13	10.23
Ulmaceae										
Ulmus davidiana var. *japonica* (Rehder) Nakai	45	19.35	1	25	13	37.52	12	6.86	9	4.38
Ulmus laciniata (Trautv.) Mayr	7	23.48	2	3.5	2	26	1	3	4	2.33

Table 11.

The characteristics of shrub community of five forest types in Liangshui National Natural Reserve, where: UPF = *Ulmus davidiana* var. *japonica—Pinus koraiensis* forest; BPF = *Betula costata—Pinus koraiensis* forest; QPF = *Quercus mongolica—Pinus koraiensis* forest; FPF = *Fraxinus mandshurica—Pinus koraiensis* forest; TPF = *Tilia—Pinus koraiensis* forest; N = number; H = high.

Families/Species	**UPF**		**BPF**		**QPF**		**FPF**		**TPF**	
	N	H (m)	N	H (m)	N	H (m)	N	H (m)	N	H (m)
Actinidiaceae										
Actinidia kolomikta (Rupr. & Maxim.) Maxim.	-	-	-	-	1	1.5	-	-	-	-
Adoxaceae										
Sambucus williamsii Hance	24	0.99	12	1.33	6	1.23	36	1.19	46	0.91
Araliaceae										
Aralia elata var. *glabrescens* (Miq.) Seem.	-	-	-	-	10	0.93	-	-	2	2
Eleutherococcus senticosus (Rupr. & Maxim.) Maxim.	51	1.1	14	0.65	15	0.41	60	0.82	25	0.75
Berberidaceae										
Berberis ferdinandi-coburgii C.K.Schneid.	-	-	-	-	-	-	10	0.47	-	-
Betulaceae										
Corylus mandshurica (Maxim.) C.K.Schneid.	23	1.87	23	1.8	45	1.47	16	0.95	29	2.04
Caprifoliaceae										
Lonicera japonica Thunb.	24	0.9	18	0.83	40	1.38	20	0.93	5	1
Celastraceae										
Euonymus alatus (Thunb.) Siebold	-	-	2	1.5	-	-	-	-	1	3.5

Hydrangeaceae										
Deutzia glabrata Kom.	-	-	-	-	4	0.4	-	-	-	-
Oleaceae										
Syringa reticulata subsp. *amurensis* (Rupr.) P.S.Green & M.C.Chang	4	5	15	2.54	11	1	-	-	-	-
Rhamnaceae										
Rhamnus davurica Pall.	2	1.8	-	-	-	-	-	-	-	-
Rosaceae										
Cerasus verecunda Koehne	9	0.7	-	-	-	-	12	0.55	-	-
Rosa davurica Pall.	-	-	-	-	1	0.8	-	-	-	-
Sorbaria sorbifolia (L.) A.Braun	7	1.45	37	1.15	-	-	7	1.2	-	-
Spiraea thunbergii Siebold ex Blume	-	-	-	-	-	-	4	0.8	-	-
Sapindaceae										
Acer pictum subsp. *mono* Thunb.	-	-	4	1.75	-	-	-	-	-	-
Acer tataricum subsp. *ginnala* (Maxim.) Wesm.	-	-	-	-	5	1.2	-	-	-	-

Table 12.

The characteristics of herb community of five forest types in Liangshui National Natural Reserve, where: UPF = *Ulmus davidiana* var. *japonica—Pinus koraiensis* forest; BPF = *Betula costata—Pinus koraiensis* forest; QPF = *Quercus mongolica—Pinus koraiensis* forest; FPF = *Fraxinus mandshurica—Pinus koraiensis* forest; TPF = *Tilia—Pinus koraiensis* forest; N = number=N; H = high.

Families/Species	UPF		BPF		QPF		FPF		TPF	
	N	H(m)	N	H(m)	N	H(m)	N	H(m)	N	H(m)
Adoxaceae										
Adoxa moschatellina L.	13	0.06	9	0.03	38	0.07	1	0.15	12	0.14
Sambucus javanica Blume	25	0.3	1	0.3	-	-	2	0.3	-	-
Amaranthaceae										
Chenopodium album L.	18	0.28	-	-	-	-	24	0.22	11	0.17

Asparagaceae										
Polygonatum odoratum (Mill.) Druce	-	-	10	0.33	-	-	-	-	-	-
Asparagus oligoclonos Maxim.	-	-	-	-	-	-	-	-	6	0.01
Athyriaceae										
Athyrium brevifrons Nakai ex Kitag.	10	0.46	82	0.23	14	0.25	51	0.34	14	0.32
Campanulaceae										
Adenophora tetraphylla (Thunb.) A.DC.	-	-	-	-	7	0.15	-	-	-	-
Cannabaceae										
Humulus scandens (Lour.) Merr.	3	1.2	-	-	1	0.2	-	-	-	-
Caryophyllaceae										
Stellaria radians L.	7	0.03	-	-	-	-	-	-	-	-
Compositae										
Artemisia stolonifera Maxim.	1	0.3	-	-	-	-	-	-	-	-
Parasenecio hastatus (Linn.) H. Koyama	9	0.45	7	0.23	-	-	-	-	-	-
Saussurea alatipes Hemsl.	30	0.45	5	0.3	-	-	-	-	3	0.6
Cruciferae										
Cardamine leucantha (Tausch) O.E.Schulz	3	0.3	-	-	-	-	4	0.2	-	-
Cyperaceae										
Carex breviculmis R.Br.	7	0.3	11	0.6	-	-	-	-	5	0.15
Carex leiorhyncha C.A.Mey.	10	0.35	28	0.3	140	0.29	74	0.38	27	0.2
Carex siderosticta Hance	-	-	-	-	-	-	3	0.1	-	-
Dryopteridaceae										
Dryopteris crassirhizoma Nakai	4	0.5	1	0.3	1	0.6	3	0.7	2	0.5
Polystichum tripteron (Kunze) C. Presl	-	-	18	0.25	-	-	1	0.15	8	0.1
Equisetaceae										
Equisetum hyemale L.	-	-	-	-	-	-	-	-	2	0.6

Fabaceae										
Lathyrus davidii Hance	-	-	-	-	10	0.16	-	-	-	-
Gramineae										
Agrostis clavata Trin.	53	0.28	44	0.28	-	-	-	-	-	-
Miscanthus sacchariflorus (Maxim.) Hack.	-	-	-	-	-	-	1	0.3	-	-
Labiatae										
Meehania urticifolia (Miq.) Makino	-	-	-	-	29	0.05	-	-	-	-
Liliaceae										
Lilium distichum Nakai ex Kamib.	-	-	-	-	3	0.28	3	0.2	-	-
Malvaceae										
Abutilon theophrasti Medik.	5	0.05	-	-	-	-	-	-	-	-
Melanthiaceae										
Paris verticillata M.Bieb.	-	-	2	0.15	33	0.1	-	-	-	-
Oxalidaceae										
Oxalis griffithii Edgew. & Hook. f.	62	0.06	51	0.04	46	0.06	176	0.08	110	0.04
Papaveraceae										
Hylomecon japonica (Thunb.) Prantl & Kündig	38	0.4	-	-	23	0.22	77	0.06	56	0.06
Phrymaceae										
Phryma leptostachya subsp. *asiatica* (Koidz.) Honda	2	0.6	-	-	-	-	-	-	-	-
Polemoniaceae										
Polemonium caeruleum L.	-	-	-	-	-	-	-	-	3	0.2
Primulaceae										
Trientalis europaea (L.) U.Manns & Anderb.	-	-	-	-	-	-	-	-	3	0.03
Pteridaceae										
Adiantum pedatum L.	-	-	-	-	-	-	40	0.25	-	-
Ranunculaceae										

Aconitum volubile Pall. ex Koelle	-	-	-	-	-	-	-	-	2	0.5
Enemion raddeanum Regel	5	0.15	11	0.23	3	0.1	33	0.26	-	-
Rosaceae										
Agrimonia pilosa Ledeb.	5	0.25	-	-	-	-	-	-	-	-
Filipendula palmata (Pall.) Maxim.	33	0.41	36	0.27	37	0.22	97	0.22	10	0.33
Fragaria orientalis Losinsk.	-	-	-	-	1	0.15	-	-	-	-
Geum aleppicum Jacq.	12	0.43	-	-	-	-	-	-	-	-
Rubiaceae										
Galium spurium L.	-	-	-	-	33	0.15	-	-	4	0.02
Ruscaceae										
Maianthemum bifolium (L.) F.W.Schmidt	5	0.07	89	0.05	-	-	4	0.04	11	0.05
Convallaria majalis L.	-	-	-	-	3	0.2	2	0.15	-	-
Saxifragaceae										
Chrysosplenium lectus-cochleae Kitag.	127	0.13	4	0.2	-	-	15	0.19	90	0.12
Chrysosplenium sinicum Maxim.	1	0.18	-	-	-	-	-	-	-	-
Scrophulariaceae										
Pseudolysimachion spurium L.	-	-	-	-	-	-	-	-	1	0.6
Umbelliferae										
Carum buriaticum Turcz.	-	-	2	0.45	-	-	-	-	-	-
Heracleum hemsleyanum Diels	-	-	-	-	-	-	3	0.3	-	-
Ostericum grosseserratum Maxim.	-	-	-	-	3	0.06	-	-	-	-
Ostericum sieboldii (Miq.) Nakai	38	0.09	63	0.09	30	0.08	35	0.08	112	0.07
Peucedanum praeruptorum Dunn	-	-	-	-	2	0.2	-	-	-	-
Sanicula rubriflora F. Schmidt ex Maxim.	7	0.18	-	-	1	1.2	36	0.18	-	-
Urticaceae										
Urtica angustifolia Fisch. ex Hornem.	20	0.4	-	-	17	0.25	24	0.3	43	0.39

Urtica laetevirens Maxim.	5	0.65	-	-	-	-	1	0.04	3	0.4
Violaceae										
Viola chaerophylloides (Regel) W. Becker	4	0.1	6	0.25	22	0.2	-	-	-	-

Coordinates: and Latitude; and Longitude.

Taxonomic coverage

Description: The dataset contains a total of 5007 tagged individuals representing 95 total taxa identified to species level belonging to 48 families and 78 genera (see Suppl. material 1).

Temporal coverage

Notes: Data range: 1 August 2016 - 1 August 2017.

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Data resources

Data package title: List of all individuals established in all 5 forest types in Liangshui National Natural Reserve.

Number of data sets: 1

Data set name: raw_data_Lsnnr.xls - Download file

Column label	Column description
Forest type	Forest community types
Family_name	Plant family for the species follwing APG IV
Genus_name	Full scientific name of the genera in which the taxon is classified
Species_name	Name of the identified species
Plot number	Transect number
Quadrat size	Quadrat size in metres
Diameter at breast height (cm)	Diameter at breast height in centimetres

High (m)	Height of vegetations in metres
Canopy diameter (m)	Canopy diameter in metres
Number	The number of the plant
Total coverage	Coverage of all species in each quadrat
Coverage	Coverage of each species

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Supplementary material

Suppl. material 1: List of all plants recorded in all 5 forest types in Liangshui National Natural Reserve. doi

Authors: Wang Hongfeng & Dong Xueyun

Data type: Excel file of List of all plants recorded in all 5 forest types in Liangshui National Natural Reserve

Brief description: This is the raw dataset of each plant individual recorded with their diameter at breast height, high, canopy diameter, as well as all shrubs and herbs recorded with their coverage, total coverage, number, height.

Filename: Suppl. material.xls - Download file (297.50 kb)